REMARKS

Claims 25 and 26 are added, and therefore claims 10 to 15 and 17 to 26 are pending in the present application.

In view of the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

Claims 10, 11, 15, 17, and 19 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Pat. No. 6,548,914 ("Caruso"), in view of Japan Pat. Pub. No. JP2001247001 ("Katsuji").

To reject a claim under 35 U.S.C. § 103(a), the Office bears the initial burden of presenting a *prima facie* case of obviousness. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish *prima facie* obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

Also, as clearly indicated by the Supreme Court in *KSR*, it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *See KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007). In this regard, the Supreme Court further noted that "rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *Id.*, at 1396. Second, there must be a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim features. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974).

Claim 10, as presented, is directed to a device for determining an instant a vehicle makes contact with an impact object and provides for *a determining* arrangement for *determining the instant of contact* by approximating a signal derived from an acceleration signal *using a quadratic function*. The Office Action admits that Caruso does not disclose this feature. However, the Office Action refers to Katsuji (an unofficial English translation of

Katsuji was provided by the Patent Office) as assertedly disclosing the features as provided for in the context of claim 10. The Katsuji reference merely concerns discerning two forms of collisions – head-on and symmetrical collisions. The Katsuji Abstract states the following:

> *When the collision form of the vehicle is the head-on collision, normalization of a locus for time of a time integrated value of deceleration detected by a floor sensor mounted in the vicinity of a center console of a vehicle gives the normalized locus accurately approximated to a quadratic curve. When the collision form of the vehicle is a symmetric collision except the head-on collision, the locus normalized in the same way is remarkably deviated from the quadratic curve. By using the result, whether the collision form is the head-on collision or not is discriminated.*

Thus, Katsuji merely concerns using a quadratic curve as a measure to discriminate head-on collisions from symmetric collisions. However, Katsuji does not disclose or even suggest the feature of ***determining the instant of contact*** . . . *by using a quadratic function,* as provided for in the context of claim 10.

Indeed, it is believed and respectfully submitted that any reading of Katsuji makes plain that it does not disclose using the quadratic curve to determine ***the instant of contact***, as provided for in the context of claim 10. Therefore, the combination of Caruso and Katsuji does not disclose all of the features as provided for in the context of claim 10, so that claim 10 is allowable for these reasons alone.

As to Figures 5 to 9 of Katsuji, the Katsuji reference merely concerns determining forms of collisions and nothing more. The Katsuji reference simply does not disclose (or even suggest) the feature of determining *the instant of contact . . . by using a quadratic function.* Further, ***the Office's assertion that a person of ordinary skill in the art would recognize impact instant by looking at the time axis of Drawings 5 to 9 has no proper objective support***. Figures 5 to 9 merely concern normalized curves as compared to a standard curve. There is simply no indication of which location on the time axis can be or look like an impact instant. It is respectfully requested that the Office specifically point out which time instant in Figures 5 to 9 is an impact instant and provide the reason that a person of ordinary skill in the art would have understood the impact instant as to the presently claimed subject matter.

As further regards Caruso, it concerns a clock counting method as a measure of time, from initiation of a possible crash event. It is a simple method of incrementing or decrementing the clock in every cycle of the program loop, depending on a increasing or a decreasing accumulated velocity. The Caruso reference concerns the removal of noisy signals from the vehicle acceleration signals for the purpose of counting. This is supposedly achieved by deriving velocity values from the acceleration signal and accumulating successive velocity values. Depending on accumulated velocity value, the clock is incremented or decremented. The Caruso reference asserts that the noisy signals can be reduced by such a method of velocity value accumulation, since the crash velocity provides a clearer signal. The emphasis is on counting of clock based on velocity value rather than acceleration signal to reduce the effects of noisy acceleration signals, rather than finding the instant of impact. The Caruso reference does not disclose the method of finding the instant of impact but merely indicates that this clock is a measure of time from the instant of impact and used to generate a deploy indication signal. The precise measurement of the instant of impact (T° → T Zero) is not disclosed. Further, the maximum limit value and the minimum limit value defined in Caruso are thresholds dependent on time. Also the counting of clock is a linear function of time directly dependent on the accumulated velocity value.

The Katsuji reference concerns the usage of a quadratic curve to determine different types of crashes. Again, there is no emphasis on finding the instant of impact, indicating that a quadratic curve can be derived from the acceleration signals for a head on collision that is then compared against quadratic curves obtained for non head-on collisions. Based on the deviation of different quadratic curves from the quadratic curve obtained for head on collision, the crashes can be discriminated into different types. The Imai reference does not teach anything regarding the instant of impact, but just refers to the classification of crash at an initial stage of the collision.

In contrast, the presently claimed subject matter concerns the exact measurement of the instant of impact by an approximation method using the vertex of a quadratic curve. The quadratic curve itself is derived from integrating the acceleration signal twice to remove any sort of noise signals. It is further derived based on the thresholds derived out of the integrated signal. The thresholds are second integral values of the acceleration signal. It can be precisely determined using the presently claimed subject, the instant of impact using the said quadratic curve. The presently claimed subject stresses upon

the quadratic curve derivation using the thresholds and approximating the instant of impact using such a curve. The presently claimed subject also shows that, when more thresholds are used in deriving the curve, the approximation would be much better and the precise instant of impact can be determined.

Therefore, the combination of Caruso and Katsuji does not disclose all features as provided for in the context of claim 10, so that claim 10 is allowable, as are its dependent claims 11, 15, 17, and 19. Withdrawal of the obviousness rejections of claims 10, 11, 15, 17, and 19 is therefore respectfully requested.

Claims 12, 13, 20, 21, and 24 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Caruso and Katsuji, in further view of U.S. Pat. No. 5,559,697 ("Wang").

Claim 14 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Caruso, Katsuji, and Wang, and in further view of U.S. Pat. No. 6,756,887 ("Evans").

Claim 18, 22, and 23 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Caruso and Katsuji, and in further view of U.S. Pat. No. 3,945,459 (Oishi").

Claims 11 to 14, 18, and 20 to 24 depend from claim 10, and they are therefore allowable for at least the same reasons as claim 10, as presented, since the Wang, Evans, Katsuji, and Oishi references do not cure (and are not asserted to cure) the critical deficiencies of the combination of Caruso and Katsuji as to claim 10, as presented.

It is important to note that if patent number JP 2001247001A and Imai Katsuji are used, Caruso does not teach about the usage of a quadratic curve in finding the instant of impact. The Caruso reference emphasizes reduction of noise by using accumulated velocity value and clock counting method and Imai explains about the quadratic curve for crash discrimination. If Imai is used in Caruso, it will be like "accumulation of velocity value using quadratic curve for clock counting". Again, the clock counting is a mere incrementing or decrementing of time based accumulated velocity value. The combination of the two prior arts, does not teach the precise manner of finding the instant of impact. Also, as indicated, the indication that "the quadratic curve is based on time, therefore, the impact determination

would determine the impact location along time axis" may not always be true, since to discriminate the crash, it is not necessary that the quadratic curve always start from instant of impact (T° → T Zero).

Also, it is clear from the explanation given that Imai would not have used the quadratic equation as to Caruso to find the instant of impact of a collision.

Accordingly, claims 11 to 14, 18, and 20 to 24 are allowable for these further reasons.

Withdrawal of the obviousness rejections of claims 11 to 14, 18, and 20 to 24 is therefore respectfully requested.

As further regards all of the obviousness rejections, any Official Notice is respectfully traversed to the extent that it is maintained and it is requested that the Examiner provide specific evidence to establish those assertions and/or contentions that may be supported by the Official Notices under 37 C.F.R. § 1.104(d)(2) or otherwise. In particular, it is respectfully requested that the Examiner provide an affidavit and/or that the Examiner provide published information concerning these assertions. This is because the § 103 rejections are apparently being based on assertions that draw on facts within the personal knowledge of the Examiner, since no support was provided for these otherwise conclusory and unsupported assertions. (See also MPEP § 2144.03).

Accordingly, all of claims 10 to 15 and 17 to 24 are allowable.

New claims 25 and 26 do not add new subject matter and are supported by the present application, including the specification (including, for example, at page 6, lines 10 to 32). Claims 25 and 26 are allowable for essentially the same reasons explained above and for the following further reasons.

Claim 25 is to a method for determining an instant when a vehicle makes contact with an impact object, the method including: sensing an acceleration, using an acceleration sensor in a control unit, and generating an acceleration signal; providing the acceleration signal to an input of a microcontroller in the control unit; smoothing the acceleration signal in a smoothing operation using a filter, the filtering including providing a double integration of the acceleration signal to provide a lower-frequency function on which

an approximating function is to be performed; performing the approximation based on interpolation points on the twice integrated acceleration signal, wherein the interpolation points are determined by threshold values and by the times at which the approximating function assumes the threshold values; determining a vertex from the approximating function, wherein in a first approximation, the vertex determines the instant of contact to provide a first determined instant of contact; and determining another instant of contact by subtracting a period of time, which is linearly dependent on the impact velocity, from the first determined instant of contact.

It is believed and respectfully submitted that the applied references, whether taken alone or combined, do not in any way disclose or suggest all of the foregoing features, including the features of *smoothing the acceleration signal in a smoothing operation using a filter, the filtering including providing a double integration of the acceleration signal to provide a lower-frequency function on which an approximating function is to be performed; performing the approximation based on interpolation points on the twice integrated acceleration signal, wherein the interpolation points are determined by threshold values and by the times at which the approximating function assumes the threshold values; determining a vertex from the approximating function, wherein in a first approximation, the vertex determines the instant of contact to provide a first determined instant of contact; and determining another instant of contact by subtracting a period of time, which is linearly dependent on the impact velocity, from the first determined instant of contact*.

Claim 26 includes features like those of claim 25, except that it is to a device (and not a method).

Accordingly, all of claims 10 to 15 and 17 to 26 are allowable.

CONCLUSION

It is therefore respectfully submitted that all of the presently pending claims are allowable. It is therefore respectfully requested that the rejections and objections be withdrawn, since all issues raised have been addressed and obviated. An early and favorable action on the merits is therefore respectfully requested.

Respectfully submitted,

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